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itself, and reduce the size of the converter.

Referring now to figure 3, there is shown a cylindrical conductor of diameter *d* and length *l*. A current loop I_1 uniformly distributed in a belt-like fashion on the periphery of the cylinder produces a magnetic field H_1 along its central axis, which generates the self inductance. For $l > 0.2d$, the following equation gives the inductance value with less than 3 % error:

$$L = \frac{2.2d^2}{d+2.21} \cdot 10^{-6}\ Henry \qquad (1),$$

where *l* and *d* are in metres. This equation is shown in "Electrotechnique", 2nd edition, page 230, by Theodore Wildi, Les presses de l'Université Laval. For example, if we put in equation (1) values of d and l that are representative of current module size known in the art, we obtain a resulting inductance of a few 10^{-9} Henry. The present invention reduces the stray interconnection inductance by providing a belt-like current path in the converter module assembly during the switching phases.

Referring now to figures 4 and 5, there are shown respectively a perspective view of a power converter module which provides a belt-like current path in accordance with the present invention, and the same module with cut parts to expose an interior portion thereof.

The low stray interconnection inductance power converting module is for converting a DC voltage into an AC voltage. It comprises two DC voltage terminals 20 and 22 for receiving the DC voltage, and an AC voltage terminal 24 for delivering the AC voltage. There is also provided a half-bridge including a pair of power switching elements 26 and 28 connected as a series totem pole between the DC voltage terminals 20 and 22 via the AC voltage terminal 24. There is a decoupling device 30 for decoupling the half-bridge. The decoupling device 30 comprises a series of at least two adjacent superimposed

What is claimed is:

1. A low stray interconnection inductance power converting module for converting a DC voltage into an AC voltage, comprising:

two DC voltage terminals for receiving the DC voltage;

an AC voltage terminal for delivering the AC voltage;

a half-bridge including a pair of power switching elements connected as a series totem pole between the DC voltage terminals via the AC voltage terminal; and

a decoupling means for decoupling the half-bridge, the decoupling means comprising a series of at least two adjacent superimposed electrode plates separated by a dielectric material and extending proximately in overlapping relation with the half bridge, each of the adjacent electrode plates being connected to a different one of the DC terminals, the electrode plates forming with the two power switching elements, the DC terminals and the AC terminal a reduced cross section belt-like current closed loop by which a low stray interconnection inductance power converting module is obtained.

2. A power converting module according to claim 1, comprising a base made of ceramic material, onto which the power switching elements are mounted, and wherein:

each of the power switching elements includes a row of power semiconductor devices mounted in parallel;

the AC terminal includes a central metal plate mounted on the base; and

each of the two DC voltage terminals includes a lateral metal plate mounted onto the base, and a lateral upright metal wall connected between the lateral metal plate and the decoupling means, the power switching elements being connected as a series totem pole between the lateral metal plates of the DC voltage terminals via

the central metal plate of the AC voltage terminal.

3. A power converting module according to claim 2, wherein the reduced cross section belt-like current closed loop is formed by the central plate, the lateral metal plates, the lateral upright metal walls, the superimposed electrode plates and the power switching elements, and has a rectangular cross section.

4. A power converting module according to claim 2 or 3, further comprising drivers mounted on the base nearby the power semiconductor devices, for driving the power semiconductor devices.

5. A power converting module according to claim 4, wherein said semiconductor devices are gate capacitance controlled semiconductor devices, and wherein each of the drivers includes:

a terminal to receive a gate signal for the corresponding semiconductor device;

a first resistor connected between the terminal and a gate of the corresponding semiconductor device;

a circuit segment including a voltage gate controlled switch and a second resistor connected in series, the circuit being connected in parallel to the first resistor;

a capacitor connected between a gate of the voltage gate controlled switch and the collector of the corresponding semiconductor device for monitoring collector voltage signal of the corresponding semiconductor device;

a voltage clamping mean connected between the gate of the voltage gate controlled switch and the terminal, whereby, in operation, the first resistor limits gate current of the corresponding semiconductor device prior to a drop of the collector voltage signal thereby limiting rise time of the collector current, and whereby, in

operation, the first and second resistors limit the gate current of the corresponding semiconductor device during said drop of the collector voltage thereby limiting dropping time of collector voltage.

6. A power converting module according to claim 2, 3, 4 or 5, comprising a control board for controlling the power semiconductor devices, the control board being located between the base onto which the power switching elements are mounted and the decoupling means.

7. A power converting module according to claim 1, 2, 3, 4, 5 or 6, further comprising walls made of conductive material for closing open ends of the belt-like current closed loop, each of the open ends being delimited by edges of the central plate, of the lateral metal plates and of the lateral metal walls and by a lower edge of the superimposed metal plates whereby, in operation, an electric current is magnetically induced into the conductive walls to further reduce voltage spikes associated to stray interconnection inductance.

8. A power converting module according to claim 1, 2, 3, 4, 5 or 6, further comprising a housing including conductive walls surrounding the reduced cross section belt-like current closed loop, whereby, in operation, an electric current is magnetically induced into the conductive walls to further reduce voltage spikes associated to stray interconnection inductance.

9. A power converting module according to claim 8, wherein at least one of the conductive walls of the housing are formed by a metal deposition over insulating walls.

10. A power converting module according to claim 8 or

9, wherein the conductive walls of the housing are made of at least two parts connected together.

11. A power converting module according to claim 8, 9 or 10, further comprising a capacitor connected between the conductive walls of the housing and one of the DC terminals, the conductive walls providing one connecting point for electrical connection purpose.

12. A power converting module according to claim 11, wherein the capacitor is formed by a wall of the conductive walls that is adjacent to a top electrode plate of the decoupling means, and that is separated from the top electrode plate by means of dielectric material.

13. The combination of three power converting modules according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 or 12, in a motor wheel provided with a stator frame supported by a cross member made of conductive material, wherein the three modules are mounted respectively on three legs of the cross member within the motor wheel, the modules forming a three-phase power converter which further comprises:

a first conductive bus connecting one of the DC terminals of each module on one side of the cross member; and

a second conductive bus connecting the other of the DC terminals of each module on the other side of the cross member, the two conductive bus delimiting spaces between adjacent modules that are filled with the conductive material of the cross member, the two conductive bus and the cross member being separated by insulating material, whereby, in operation, an electric current is magnetically induced in the cross member to suppress the voltage oscillations on the capacitor of each module due to the stray interconnection inductance present between the

modules.

14. A method for converting a DC voltage into an AC voltage, comprising:

applying the DC voltage on two DC voltage terminals between which a half-bridge is connected, the half-bridge including a pair of power switching elements connected as a series totem pole between the DC voltage terminals via an AC voltage terminal;

alternately switching the power switching elements;

decoupling the half-bridge by means of a decoupling means comprising a series of at least two adjacent superimposed electrode plates separated by a dielectric material and extending proximately in overlapping relation with the half bridge, each of the adjacent electrode plates being connected to a different one of the DC terminals, the electrode plates forming with the two power switching elements, the DC terminals and the AC terminal a reduced cross section belt-like current closed loop; and

delivering the AC voltage by means of the AC voltage terminal.

15. A method according to claim 14, comprising the additional step of surrounding the reduced cross section belt-like current closed loop by means of a housing including conductive walls, whereby, in operation, an electric current is magnetically induced into the conductive walls to further reduce voltage spikes associated to stray interconnection inductance.